



**PATENT APPLICATION**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re the Application of

Hiroyuki MOCHIZUKI

Group Art Unit: 1794

Application No.: 10/572,643

Examiner: Brett A. CROUSE

Filed: March 20, 2006

Docket No.: 127380

For: ORGANIC ELECTROLUMINESCENT ELEMENT AND MANUFACTURING  
METHOD THEREOF

**DECLARATION UNDER 37 C.F.R. §1.132**

I, Hiroyuki MOCHIZUKI, a citizen of Japan, hereby declare and state:

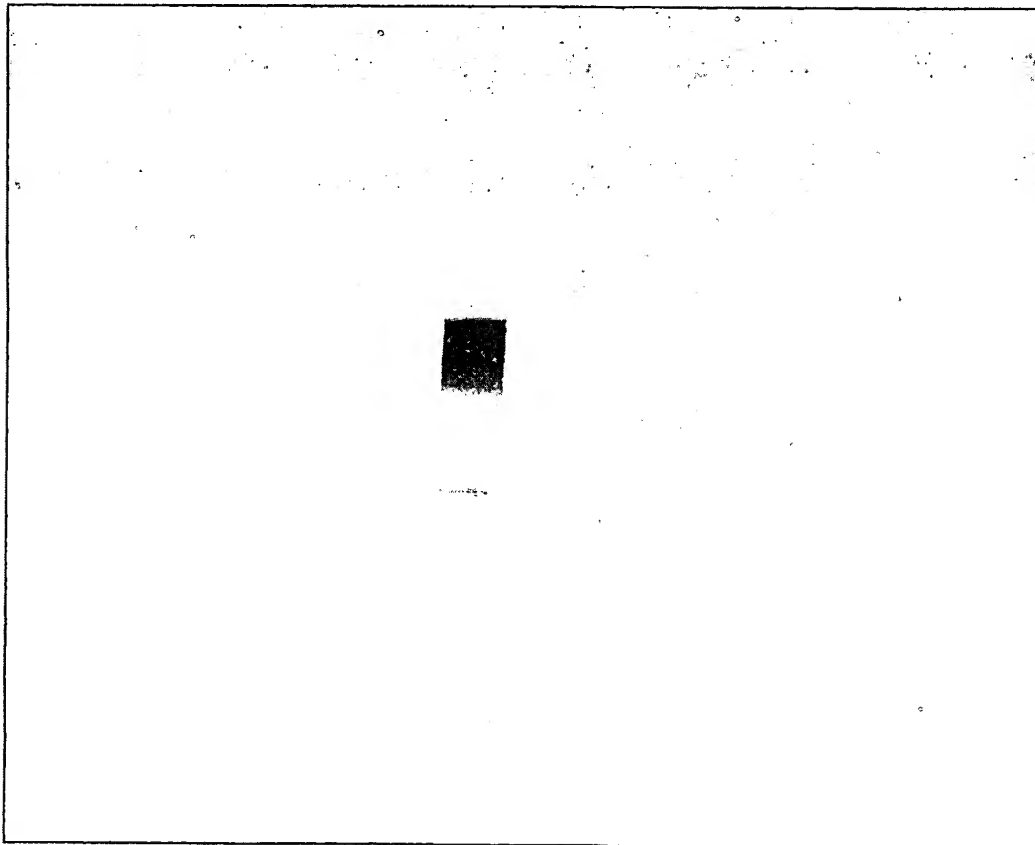
1. I have a doctoral degree awarded by the Interdisciplinary Graduate School of Science and Engineering, Tokyo Institute of Technology, in March 2001, where my doctoral thesis was in the field of organic electroluminescent devices.
2. I have been employed by the National Institute of Advanced Industrial Science and Technology (AIST) from April, 2001 to March, 2009 and from April, 2010 to the present time and I have a total of more than nine years of work and research experience in polymer opto-electronic devices. Further, I was employed by the New Energy and Industrial Technology Development Organization (NEDO) from April, 2009 to March, 2010 and I have a total of more than ten years of work and research experience in polymer opto-electronic devices.
3. I am a named inventor in the above-identified patent application.
4. I have a professional relationship, as an employee, with an assignee of the above-identified patent application. In the course of that professional relationship, I received compensation directly from the assignee for my work relating to polymer opto-electronic

devices. I am not being compensated for my work in connection with this declaration, other than my regular compensation as an employee.

5. I and/or those under my direct supervision and control have conducted the following tests:

**I. Electroluminescent device manufactured by Matsuo's Method (Experimental Example 16)**

An orange color fluorescent dye, 4-(dicyanomethyl)-2-methyl-6-(4-dimethylaminostyryl)-4-H-pyran (DCM) was deposited on the PPV (i.e. poly(p-phenylenevinylene)) formed on a glass substrate, and then the obtained sample was heat-treated at 110°C for 1 minute by used of the hot plate. When the inventor then wiped the vermilion (Red) surface of the PPV with cotton soaked in acetone, the vermilion portion disappeared and subsequently the original yellow of PPV exposed on the surface. From this, it could be understood that the DCM does not penetrate into the PPV.



Yellow: exposed PPV after wiped with cotton soaked in acetone

Red: deposited DCM on the PPV

Further, an orange color fluorescent dye, 4-(dicyanomethyl)-2-methyl-6-(4-dimethylaminostyryl)-4-H-pyran (DCM) was deposited on the PPV (i.e. poly(p-phenylenevinylene)) formed on a glass substrate which had an ITO electrode, in thickness of 40 nm. Then, the obtained sample was heat-treated at 110°C for 1 minute by used of the hot plate. And then, silver and magnesium were deposited together to laminate a negative electrode, thereby producing an electroluminescent device. The electroluminescent device manufactured by Matsuo's Method emitted orange-color light and the maximum luminance of less than 1 cd/m<sup>2</sup> at 14V. The quantum efficiency was therefore less than 0.005 lm/w.

## **II. Electroluminescent device manufactured by the method of the present application (Example 2)**

The electroluminescent device of Example 2 in the present application emitted orange-color light with a maximum luminance of 2000 cd/m<sup>2</sup> at 14V. The external quantum efficiency was 4.1 lm/w.

As demonstrated by these results, the efficiency of the electroluminescent device manufactured by Matsuo's Method is inferior to the electroluminescent device of the present invention.

I hereby declare that all statements made herein of my own knowledge are true, and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so

made are punishable by fine and/or imprisonment under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing therefrom.

Date: November 1, 2010

H. Mochizuki  
Hiroyuki MOCHIZUKI